--33. An apparatus for a non-invasive measurement of at least one analyte in blood in a body part of a patient, comprising:

a light transmitter having a plurality of transmitting fibers positioned for transmitting light to the body part of the patient;

a light detector having a plurality of light detector fibers for detecting light transmitted through, or reflected from, the body part of the patient; and,

means for utilizing a non-pulsatile element of the blood in the body part of the patient for determining a measurement of at least one analyte in the blood.

34. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, further comprising means for utilizing a pulsatile element of the blood in the body part of the patient for determining the measurement of at least one analyte in the blood.

35. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, further comprising a plurality of closely associated transmitters and generators for providing an "average-evened out" signal to be produced for representing the measurement of at least one analyte in the blood.

36. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, further

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comprising means for measuring blood glucose level.

37. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, further comprising means for measuring blood oxygen saturation ($SO_2$).

38. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 37, wherein said means for measuring blood oxygen saturation ($SO_2$) includes calculation means using the equation:

$$SO_2 = 100 \cdot (OXI + 0.43)/1.5,$$

wherein,

OXI is the oxygenation index of the blood of the patient and is defined by the equation:

$$OXI = [(e - d)/11.7 - (d - c)/11.6] \cdot 100/HbI,$$

wherein,

HbI is the hemoglobin index of the blood of the patient and is defined by the equation:

$$HbI = [(b-a)/27.1 + (c-b)/21.4 + (c-e)/23.3 + (c-f)/13.6] \cdot 100$$

and wherein,

a = absorption value at 500.9 nm wavelength of light;

b = absorption value at 528.1 nm wavelength of light;

c = absorption value at 549.5 nm wavelength of light;

d = absorption value at 561.1 nm wavelength of light;

e = absorption value at 572.7 nm wavelength of light;

and,

f = absorption value at 586.3 nm wavelength of light.

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39. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, further comprising means for measuring hemoglobin index (HbI).

40. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 39, wherein said means for measuring the hemoglobin index (HbI) includes calculation means using the equation:

$$HbI = [(b-a)/27.1 + (c-b)/21.4 + (c-e)/23.3 + (c-f)/13.6] \cdot 100$$

wherein,

    a = absorption value at 500.9 nm wavelength of light;

    b = absorption value at 528.1 nm wavelength of light;

    c = absorption value at 549.5 nm wavelength of light;

    d = absorption value at 561.1 nm wavelength of light;

    e = absorption value at 572.7 nm wavelength of light;

and,

    f = absorption value at 586.3 nm wavelength of light.

41. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, further comprising means for measuring temperature of the blood of the patient.

42. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, wherein said apparatus includes means for measuring at least two analytes in the blood of the patient, said at least two analytes being selected from blood glucose level, blood

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oxygen saturation (SO₂), hemoglobin index (HbI) and temperature of the blood of the patient.

43. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 42, wherein said wherein said means for measuring at least two analytes in the blood of the patient is a computer program.

44. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 43, wherein said computer program conducts a multiple linear regression analysis on spectral data collected by said plurality of light detector fibers.

45. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 42, wherein said apparatus includes means for measuring each of blood glucose level, blood oxygen saturation (SO₂), hemoglobin index (HbI) and temperature of the blood of the patient.

46. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, wherein said apparatus includes a greater number of said transmitting fibers than said light detector fibers.

47. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, wherein said light detector includes from 6 through 18 of said light detector fibers.

48. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 47, wherein said light detector includes 12 of said light detector fibers.

49. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, wherein said light detector fibers and said transmitting fibers each have diameters of from 200 to 300 microns.

50. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, wherein said light detector fibers are positioned for detecting transmitted light rather than reflected light.

51. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 33, wherein said plurality of transmitting fibers use a wavelight of light of from 500 to 1,100 nm.

52. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 51, wherein said plurality of transmitting fibers use a wavelight of light of from 800 to 1,100 nm.

53. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 51, wherein members of said plurality of transmitting fibers used transmit light having each of the wavelengths of 500.9 nm, 528.1

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nm, 549.5 nm, 561.1 nm, 572.7 nm and 586.3 nm.

54. The apparatus for a non-invasive measurement of at least one analyte in blood according to Claim 51, wherein members of said plurality of transmitting fibers used transmit light having each of the wavelengths of 500.9 nm, 528.1 nm, 549.5 nm, 561.1 nm, 572.7 nm, 586.3 nm and from 800 to 1,100 nm.

55. A method for measuring blood oxygen saturation in blood of a patient, comprising the steps of:

placing against a body part of a patient an apparatus for a non-invasive measurement of at least one analyte in blood in a body part of a patient, said apparatus comprising:

a light transmitter having a plurality of transmitting fibers positioned for transmitting light to the body part of the patient;

a light detector having a plurality of light detector fibers for detecting light transmitted through, or reflected from, the body part of the patient;

means for utilizing a non-pulsatile element of the blood in the body part of the patient for determining a measurement of at least one analyte in the blood; and,

means for measuring blood oxygen saturation ($SO_2$), said means for measuring blood oxygen

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saturation ($SO_2$) including calculation means using the equation:

$$SO_2 = 100^*(OXI + 0.43)/1.5,$$

wherein,

OXI is the oxygenation index of the blood of the patient and is defined by the equation:

$$OXI = [(e - d)/11.7 - (d - c)/11.6]^*100/HbI,$$

wherein,

HbI is the hemoglobin index of the blood of the patient and is defined by the equation:

$$HbI = [(b-a)/27.1 + (c-b)/21.4 + (c-e)/23.3 + (c-f)/13.6]^*100$$

and wherein,

a = absorption value at 500.9 nm wavelength of light;

b = absorption value at 528.1 nm wavelength of light;

c = absorption value at 549.5 nm wavelength of light;

d = absorption value at 561.1 nm wavelength of light;

e = absorption value at 572.7 nm wavelength of light; and,

f = absorption value at 586.3 nm wavelength of light; and,

utilizing said light detector of said apparatus for measuring light transmitted through, or reflected from the body part of the patient.

56. A computer program for measuring one or more of the hemoglobin index, the oxygenation index or the blood oxygen saturation level in blood of a patient, comprising:

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a computer readable medium having computer program code means on said computer readable medium, said computer program code means calculating one or more of the following equations:

HbI is the hemoglobin index of the blood of the patient and is defined by the equation:

$$HbI = [(b-a)/27.1 + (c-b)/21.4 + (c-e)/23.3 + (c-f)/13.6] \cdot 100$$

wherein,

    a = absorption value at 500.9 nm wavelength of light;

    b = absorption value at 528.1 nm wavelength of light;

    c = absorption value at 549.5 nm wavelength of light;

    d = absorption value at 561.1 nm wavelength of light;

    e = absorption value at 572.7 nm wavelength of light;

and,

    f = absorption value at 586.3 nm wavelength of light;

OXI is the oxygenation index of the blood of the patient and is defined by the equation:

$$OXI = [(e - d)/11.7 - (d - c)/11.6] \cdot 100/HbI; \text{ and,}$$

$SO_2$ is the blood oxygen saturation of the blood of the patient and is defined by the equation:

$$SO_2 = 100 \cdot (OXI + 0.43)/1.5.--$$

## REMARKS

Prior to an examination on the merits of the above-identified patent application, please enter the foregoing preliminary amendments.

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